

Bachelor's Thesis: Investigating Signal Anisotropy of Nuclear Quadrupole Resonance Spectroscopy in Stibnite

Overview

Nuclear Quadrupole Resonance Spectroscopy (NQR) is very similar to Nuclear Magnetic Resonance (NMR) Spectroscopy, but it is used for the investigation of different nuclei.

NQR uses exactly the same instrumentation as NMR, but no permanent magnet is needed. Because of the similarity in the instrumentation, NQR is used to teach students about the instrumentation of NMR and Magnetic Resonance Imaging (MRI).

The aim of this project is to investigate the signal anisotropy of NQR spectroscopy in stibnite. When placing a stibnite sample in a probe coil and applying a radio frequency pulse, the NQR signal is detected. The signal strength is dependent on the orientation of the sample with respect to the probe coil.

You will be involved in the development of a new NQR spectroscopy setup and will be responsible for the acquisition and analysis of the NQR data.

Specific tasks

- Literature review
- Development of a new NQR spectroscopy setup to investigate the signal anisotropy
- Acquisition of NQR data
- Analysis of NQR data

Recommended Knowledge

- Very Basic knowledge in NMR and NQR spectroscopy
- Interest in building and developing new hardware setups
- Independent development of experimental setups with hands-on work
- (Optional) Basic knowledge in Radio Frequency (RF) electronics



Figure: The spectroscopy setup, hands on work in the lab and the measurement of the NQR signal are all part of the thesis.

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